

**PROCESS DISPLAY
Type 510
User Guide**

Continuous development may necessitate
changes in these details without notice

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PROCESS MEASUREMENT, CONTROL & DISPLAY INSTRUMENTATION

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WARNING!

It is important that this guide is read and fully understood before attempting installation or commissioning of the instrument. Instructions appearing in this document, and current safety legislation, must be observed to ensure personal safety and to prevent damage to the instrument or equipment connected to it.

The instrument should be installed, commissioned and operated *only* by suitably qualified and authorised personnel.

Safety and EMC information

Safety: EN61010 -1

Immunity: EN50082-1

Emissions: EN50081-1

CE certified



The specifications for the instrument must not be exceeded. If the instrument is used in a manner not specified, the protection provided by the instrument may be compromised.



The instrument must be installed in an enclosure that provides adequate protection against electric shock.



Ensure that power to the instrument is switched off and signal wiring isolated from hazardous voltages before carrying out installation or maintenance.



The instrument is designed for installation in a clean, dry environment (Pollution degree 1).



Stroud Instruments Ltd strongly recommends that repairs and re-calibration work are done on a return to factory basis in order that our quality standards, product specifications and safety precautions are not compromised.



The instrument is double insulated

Note: Clean with a moist cloth - USE NO SOLVENTS.

Installation



WARNING: Installation should be conducted by appropriately skilled and authorised personnel only.



WARNING: Ensure that power to the instrument is switched off and signal wiring isolated from hazardous voltages before carrying out installation.



WARNING: The instrument must be installed in an enclosure that provides adequate protection against electric shock.

Location

- The instrument is designed for installation in a clean, dry environment. The optional splash resistant cover affords protection up to IP65 for the front panel. The actual protection rating is dependant on the seal between the back of the bezel and the mounting surface and hence the care with which it is installed.
- Do not install near to switch gear, motor controllers or other sources of strong magnetic fields.
- Avoid exposure to direct sunlight and ensure the ambient temperature inside the enclosure that the unit is mounted in will not exceed our specification.

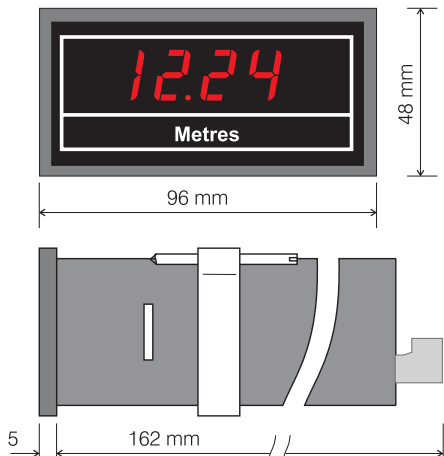
Fixing

1. Slide the panel clamp off the case
2. Insert the instrument into the panel cut-out.
3. At the rear of the panel, slide the panel mounting clamp along the case until the tongues lock into place into the slot on each side of the case.

4. Turn the clamp screws until they just touch the panel surface.
NB Do not overtighten - If screwed down hard, difficulty will be experienced in removing the front bezel and may result in damage to the enclosure.

Dimensions

Panel cut-out 92 x 44mm (+0mm -1mm)



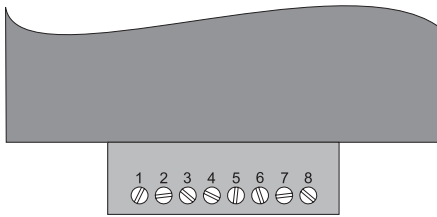
Wiring and connections

- Segregate power supply and signal wiring.
- Use screened cable for all signal wiring with the screen earthed at instrument end only.
- All connections should be made using ferrules.

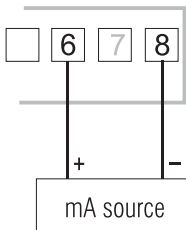
Unpluggable screw terminal connectors* are provided which will accept wires 0.2 - 2.5 sq. mm (24 - 12 AWG).

*NB Earlier versions have a fixed connector.

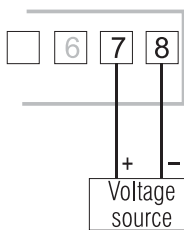
Input connections



mA input



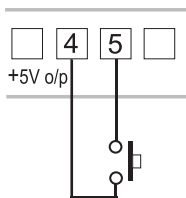
Voltage input



Note: The instrument must be set up for the type of input to be measured - see *Configuration*.

Display Test or Hold function

- see externally controlled functions options in *Configuration* section.



Power supply connections

This instrument is supplied in *one* of two power supply versions.

1. AC 110/220/240 VAC, $\pm 10\%$
50/60 Hz 5VA.
2. DC 12V or 24V DC, $\pm 10\%$ 3.5W



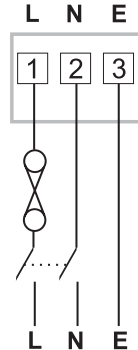
WARNING: Check that the supply voltage on the data label (on top of instrument) is suitable for the application.



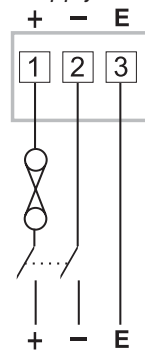
WARNING: Ferrules must be used for AC mains power wiring

Power supply wiring to the instrument should be protected by a suitable fuse and double pole switch - see below. The switch should be clearly marked as the isolating switch for the instrument.

AC mains



DC supply



Please note:

The unit cannot be changed by the user from one type of power supply version to another. This conversion can only be done on a return to factory basis.

Configuration

If calibration details are specified at the time of ordering, ranges will have been set and tested at our works before despatch. If not specified, the unit will be set to read 0-100.0 for 4-20mA input and the legend reading “%”. See Appendix 1 for an example configuration

The instrument is configured by means of internal links and trim controls. Once the links are set as required, the instrument may be slid back into its enclosure, powered up and the final trimming of span, and if required zero, carried (see Calibration).

Access to adjustments



WARNING! SWITCH OFF ALL POWER SUPPLIES AND ISOLATE SIGNAL WIRING FROM DANGEROUS VOLTAGES BEFORE PROCEEDING.

1. Unplug the connector from the rear of the instrument. *NB on the earlier type, the connector is fixed to the rear panel and this step does not apply.*
2. Loosen the panel mounting clamp sufficiently to enable the front panel bezel to be unclipped.
3. At approximately 20mm from either corner, using your fingers, prise away the top edge to unclip and remove the bezel.
4. Remove the display window by inserting a suitable implement into the cut-out in the left hand edge of the window and carefully easing out.

5. Slide out the PCB assembly.

NB on the fixed connector version, holes adjacent to the trim pots are provided for inserting a loop of wire as an aid for pulling out the assembly.

Never attempt to pull out the unit by grasping the display or pushing on the display to return the PCB into the case!

Input signal selection

The 510 may be set to accept one of six ranges of input signal. This setting requires a combination of the Input Signal selection jumper link and the True Zero / Raised Zero selection jumper link.

See Fig 1 for the location of the links and Table 1. for the settings.

Table 1

Input	Input Link	RZ/TZ Link	Input Bias Polarity
0 - 1 V	1V	TZ	n/a*
0 - 5 V	5V	TZ	n/a*
0 - 10 mA	10MA	TZ	n/a*
0 - 15 mA	16MA	TZ	n/a*
0 - 20 mA	20MA	TZ	n/a*
4 - 20mA	16MA	RZ	' - '

* position of link has no effect

Full scale (Span) and Zero

Scaling in engineering units may be set to any portion of the display range i.e. within the range -1999 to +1999. *Please note: the minimum recommended span is 200.*

The required readouts at span and zero are set initially by internal jumper links (coarse setting) and followed by fine

trimming via the front panel Span and Zero controls.

For electrical safety, Span and Zero link settings are carried out with the instrument unplugged and withdrawn from its case. Fine trimming of span/zero is achieved after the instrument is returned to its case and reconnected.

Setting the reading at zero (coarse setting)

The **Display Bias links** are used to set the engineering units displayed when the input signal is at its zero value. Refer to Fig 1 and set the Display Bias Links as required. The values shown in Fig 1 are the approximate maximum readouts expected for each link position.

For example; with the links in the positions shown in Fig 1, the approximate maximum reading which can be set is '1940'.

Please note:

- (i) The pair of Display Bias links are moved as one, keeping them in the configuration shown in Fig 1.
- (ii) With the Display Bias links at in the '000' (MIN) position, the zero reading is automatically set and the front panel Zero control is ineffective.

Display Bias Polarity

The engineering units displayed when the input signal is at its zero value may be a true zero (see note (ii) above), negative or a positive quantity. See the Display Bias Polarity link. See Fig. 1.

For example; with the Display Bias Polarity link and the Display Bias links set as shown in Fig 1, the approx. maximum reading which can be set with the input signal at zero would be '-1940'.

Input Bias Polarity

With raised zero inputs, e.g. 4-20mA, the Input Bias Polarity link is set to the 'negative' position i.e. the raised zero component is subtracted from the input signal. For true zero inputs the position of this link is immaterial. There are instances where the link must be set in the 'positive' position. For example where a **reverse reading** with a 4-20mA input signal is required i.e. this would give a full scale readout at 4mA and zero readout at 20mA.

See the 'Reverse Reading' example in Appendix 2.

Setting the reading at full scale (coarse setting)

The Span Selector link in conjunction with the Coarse / Fine Trim select link is used to set the display reading for full scale input signal.

Refer to Fig 1 and Table 2 and set the Span selector link as required.

Table 2

Coarse / Fine trim Link	Span selector Link	Approximate Readout
C	9	120-175
C	8	175-250
C	7	250-350
C	6	350-500
C	5	500-700
C	4	700-1100
F	3	1100-1430
F	2	1430-1850
F	1	1850-1999

Externally controlled functions

Display Test

This function checks whether all segments of the LED displays are functioning. Display Test is activated by either an external 5 VDC signal or by a switch between Terminal 4 and Terminal 5. In display test mode a correctly functioning display will show ‘-1888’.

NB Display Lamp Test will not illuminate decimal points. The decimal point displayed will be as set by the switch on the display panel.

Display Hold

This function holds the readout at the value currently sampled by the analogue to digital converter.

Display Hold is activated by either an external 5 Vdc signal or by a switch between Terminal 4 and Terminal 5.

Display window legend

The legend for the display window is easily changed. A pocket at the rear of the window is designed to hold a folded paper legend.

Dimensions for the legend shown below:

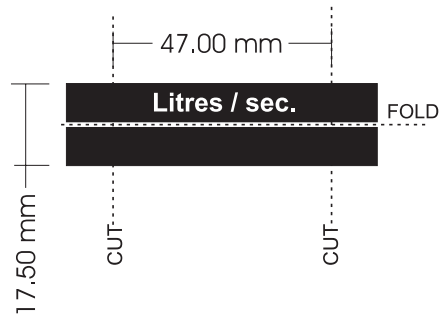
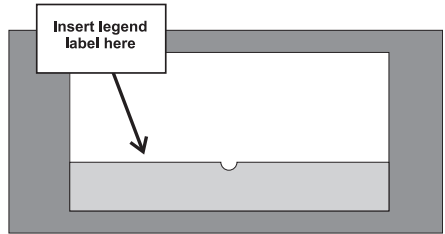
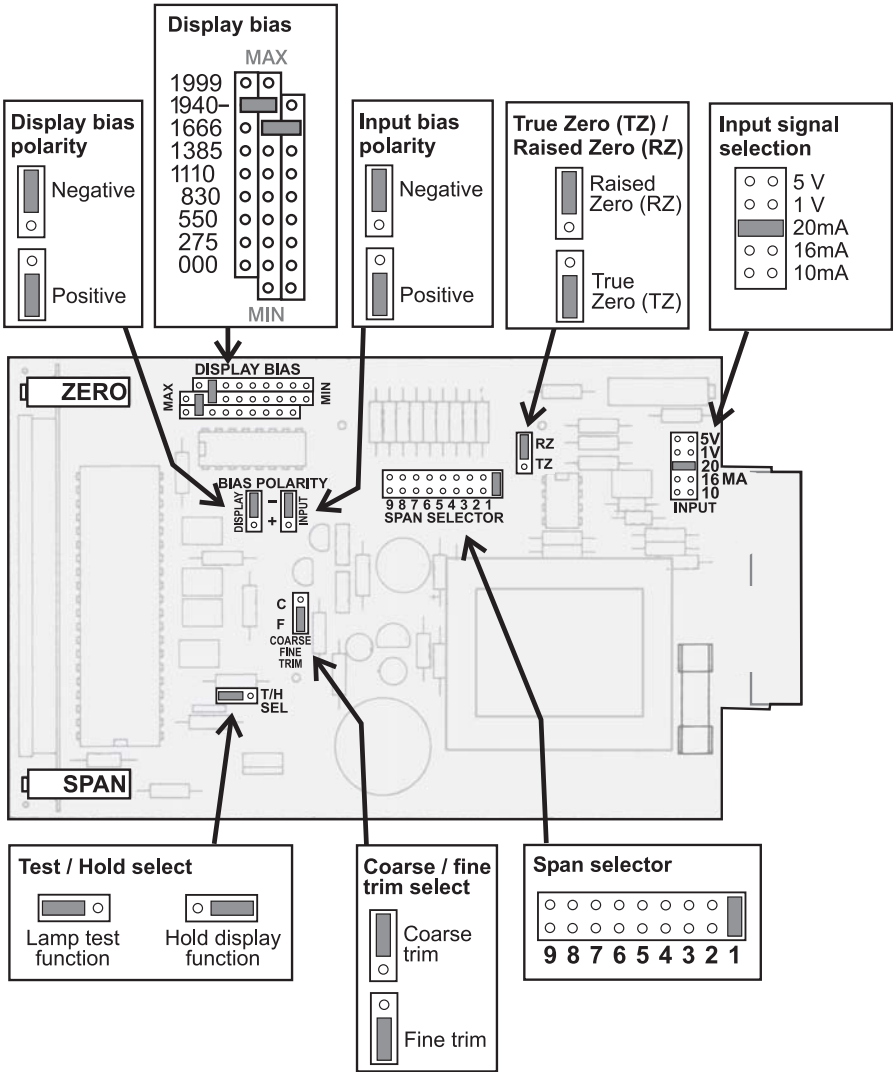


Fig. 1 Location of configuration links and trim pots



Calibration

For the final setting up of Span and Zero, slide the PCB assembly back into its case. **IMPORTANT!** Do not press on the LED display! The display window and bezel are replaced after calibration is completed.

1. Power up the instrument for one hour before calibrating.
2. With the input signal set to its 'zero' value adjust the Zero trim control to obtain the required readout.
NB if the Display Bias links have been set to the '000' position, the Zero control will have no effect.
3. With the input signal set to its full scale value adjust the Span trim control to obtain the required readout.
NB If a zero offset is used, i.e. the display is other than all zeros with input signal at its zero value, some interaction between the full scale and zero settings will occur and the fine trimming of span and zero may have to be repeated until the desired readings are obtained.

Decimal point setting

Set the required (fixed) decimal point with the switch adjacent to the display.



Final reassembly

On completion of calibration,

1. Place the display window into the recess in the front of the case.
2. Locate the bottom of the bezel onto the front of the case and press the top of the bezel up and in until it clicks home.
3. Refer to the fixing instructions under 'Installation' for readjusting the panel clamp screws.

Changing supply voltage / fuse



WARNING! SWITCH OFF ALL POWER SUPPLIES AND ISOLATE SIGNAL WIRING FROM DANGEROUS VOLTAGES BEFORE PROCEEDING.

DC powered versions

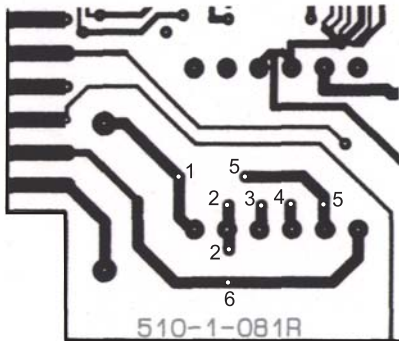
There are no facilities for changing the operating voltage. Such modifications can only be carried by returning to our factory.

Gaining access

Refer to 'Access to adjustments' for instructions on removing the instrument from its case.

Mains transformer tapping links

Mains tapping links are located on the back of the PCB. Details of the links required for various mains supply voltages are shown below. The links are made using tinned copper wire.



- 240v link 2-3 & 4-5
- 220v link 2-5
- 110v link 2-6 & 1-5

Fuse

The instrument is protected by an internal fuse which is located between the transformer or DC power unit and the PCB connector.

- AC Supply 100mA quick blow
- DC Supply 250mA anti-surge

Appendices

1. Configuration example

Input signal = 0-5VDC

Readout with an input of 0V = -200

Readout with an input of 5V = 1000

- (i) Set Input signal selector to '5V'
- (ii) Set RZ / TZ link to TZ
- (iii) Set Display Bias links to '275' position
- (iv) Set Display Bias Polarity to ' Negative'
- (v) Set span selector to position '4'
- (vi) Set Coarse/Fine Trim link to 'C'

(ii) With the input signal at 20mA, adjust the Zero control to set the readout to '0000'.

2. Reverse reading

The 510 may be configured for reverse reading e.g. with a 4-20mA input signal, at 4 mA the readout will be at its full scale value and at 20mA it will be at its zero value.

Example:

A 4-20mA signal is required to display '1000' at 4mA and '000' at 20mA.



SWITCH OFF ALL POWER SUPPLIES AND ISOLATE SIGNAL WIRING FROM DANGEROUS VOLTAGES BEFORE PROCEEDING.

- 1. Reverse the input signal connections such that the '+' wire is connected to Terminal 8 and the '-' wire to Terminal 6.
- 2. Set the Input Bias Polarity to positive '+' (see Fig 1)
- 3. Set the Display Bias links to the position for '1110'.
- 4. Proceed with the instructions given in 'Calibration' but note that the Span and Zero trim controls will have their roles reversed as follows:
 - (i) With the input signal at 4mA, adjust the Span control to set '1000'.

2. Specification

INPUTS

User selectable, 4-20mA, 0-10mA, 0-20mA, 0-1V, 0-5V

Impedance: Current 100 ohms; Voltage >270k ohms

Overrange protection: Voltage Inputs 250 volts RMS or DC. Current Inputs 100mA dc

DISPLAY

Type: 3½ digit red LED, 14.2 mm high

Accuracy: 0.1% of FSD ± 1 digit (if factory set)

Linearity: ± 1 digit (from best fit straight line)

Sample rate: Approx 3 per second

Decimal point selection: none, 0.0, 0.00, 0.000

Custom engineering units: Zero ±1999; Span ±0-150 to ±0 to 1999

Polarity: Automatic with negative sign displayed

TEMPERATURE COEFFICIENTS

±100ppm /°C typical

TEMPERATURE RANGE

Operating: -10°C to +55°C

Storage: -30°C to +60°C

SUPPLY VOLTAGE REJECTION

Span change: <0.1% span / % supply change

SERIES MODE REJECTION

<0.2% error for 50Hz signal equal to 50% span

POWER SUPPLY

AC 110/220/240 Vac, ±10% 50/60Hz 5VA (standard)

DC 12V or 24V ± 10% 3.5W (option)

WEIGHT

Approx. 420 grams